

**RESULTS OF THE FEBRUARY 27, 2007
UTAH GROUND SHAKING WORKING GROUP MEETING**

Ivan Wong, Facilitator
Gary Christenson, UGS liaison and recorder

Members present:

Kim Olsen
Harold Magistrale
Jim Pechmann
Walter Arabasz
Relu Berlacu
Ken Stokoe
Mark Petersen
Kris Pankow
Greg McDonald

Guests:

Bob Carey
Bill Lund
Dave Marble
Barry Welliver
Ashley Elliott
Chris DuRoss
Bill Stephenson
Jonathan Hermance
Tyler Knudsen
Brad Wilder
Richard Giraud

ACTION ITEMS

Jim Bay/Bill Stephenson- Rob Williams/Ken Stokoe-Brad Wilder – Evaluate differences in shear-wave-velocity profiles at the FTT and NOQ ANSS sites and Youd farm site.

Ken Stokoe – Contact Rob Williams (USGS) regarding re-interpretation of Tinsley downhole shear-wave-velocity data in the Spanish Fork area.

Jim Pechmann – Find original Ken Cook raw gravity data (particularly for Weber, Davis, and Utah Counties) for possible use by a USGS post-doctoral researcher to model basin configuration, similar to Radkins model for Salt Lake County (*completed 3/07*).

UGS/GSWG

- Assist USGS in finding sites for microtremor monitoring studies tentatively planned for summer 2007
- Assist in identifying funding for completion of CVM.
- Review CVM.
- Review new USGS and UTA data with respect to basin geology to help interpret R1, R2, and R3 (depths, Vs, geology, etc.).
- Solicit input from users (engineers, planners, etc.) regarding final content and format of urban hazard maps.

PRIORITIES FOR 2008 STUDIES

- Collect additional shallow Vs30 data for Weber/Davis/Utah Counties.
- Collect intermediate and deep Vs data in Weber/Davis/Utah Counties, and additional data in Salt Lake County if sites are available.
- Form a working group to develop a near-surface site-amplification model(s).
- Use CVM to perform deep-basin model simulations and evaluate its validity; evaluate R1 and R2 surfaces with respect to Vs data and define their velocities.

MEETING SUMMARY

PRESENTATIONS AND SPEAKERS:

- 1) Update on USGS High-Resolution Seismic Imaging Investigations along the Wasatch Front; *Bill Stephenson, USGS*
- 2) SASW Testing with “Liquidator” in Salt Lake Valley; *Brad Wilder, UTA*
- 3) Wasatch Front Urban Corridor Vs Testing and Site Conditions Mapping Update; *Greg McDonald, UGS*
- 4) The Impact of the NGA Attenuation Models on Hazard in Utah; *Ivan Wong, URS Corp.*
- 5) 2007 National Seismic Hazard Maps for Utah; *Mark Petersen, USGS*
- 6) Construction and Verification of a Wasatch Front Community Velocity Model; *Harold Magistrale, SDSU*
- 7) Validation of the Wasatch Front Community Velocity Model – Preliminary Waveform Fits; *Kim Olsen, SDSU*

DISCUSSION ITEMS:

Site Characterization

- General agreement exists for using the same faults in the NSHM (including additions for the 2007 update) for the urban hazard maps; less active, poorly understood faults that don’t meet NSHM fault criteria will not be included.
- The UQFPWG and UGS will work with the USGS to define fault parameters for the urban hazard maps.
- The USGS can perform a full logic-tree analysis to include uncertainties in all or most of the fault parameters for the final maps, even though this is not done for the NSHMs.
- USGS has incorporated many of the BRPEWG recommendations in characterizing seismic sources, except for magnitude-frequency (characteristic vs. exponential) relationships; discussion was deferred to the UQFPWG meeting on Feb. 28.
- Rupture directivity will be handled in 3D simulations.

Site Amplification models

- Several options exist for near-surface amplification models
 - Use Vs30 map and appropriate NGA attenuation relation for the mapped site condition.
 - Use geotechnical 1D approach to calculate region-specific amplification factors.
 - Continue to use NEHRP factors.
- The GSWG should form a sub-group to develop a site amplification model(s).
- Amplification factors need to be consistent with observed small-strain amplification.
- Amplification factors should be depth-dependent if data allow.
- Methods using the SHAKE program reduce high-frequency motions in soft soils which may not be desired.

Basin Models

- New UTA and USGS deep data need to be added to CVM to identify data gaps.
- Simulations should be done using the updated CVM.
- More Vs data are needed along basin edges to model edge effects, which can be important at high frequencies.
- We should review definitions and existing data to re-evaluate our use of R1 and R2 for basin modeling.
- USGS may be able to provide work by a post-doctoral researcher using the raw gravity data to develop deep-basin models for Weber, Davis, and Utah Counties.
- One team is funded for basin-model simulations for a M 7 SLC segment earthquake using the CVM; other basin-modeling projects may be valuable.

Attenuation

- NGA attenuation relations will be available and should be used in urban hazard maps. NGA relations use Z(1.5) and Z(2.5) as proxies for basin effects.
- Might consider numerical modeling to develop attenuation models which include region-specific characteristics of ground shaking along the Wasatch Front, similar to what was done in the SLC hazard maps.

General Use of Wasatch Front Urban Hazard Maps

- Given the available site-amplification and basin data, accurate code-based design-level urban hazard maps may be difficult to develop.
- The urban hazard maps may be most valuable for higher level performance-based design rather than minimum code-based design.

Schedule for Map Completion

- Complete and validate the CVM by 12/07 (Magistrale, Olsen, Pechmann).
- Propose site-amplification modeling for 2008 NEHRP (Wong, others). If funded, results available by 12/08-6/09.
- Perform basin modeling by 12/08 (Pechmann, Olsen).
- Begin urban hazard map development in 2009.